

Accuracy of Frozen Section Diagnosis in Nodular Goiter *

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FROZEN section technic, as a method of rapidly determining a tissue diagnosis in surgery, has been available for over half a century. Jennings and Landers⁸ state that Welch probably did the first frozen section in 1891—a breast lesion removed by Halsted. However, they credit Wilson¹⁴ and MacCarty¹⁰ at the Mayo Clinic with developing the technic as an accurate and reliable procedure. Many^{2, 6, 11, 13} have been critical of the procedures reliability, but since its inception, tissue diagnosis by frozen section has become an established technic in many hospitals. Unfortunately, there is little published data on the accuracy of diagnosis with frozen sections, but reports range from 89² to 100 per cent.⁴

Surgery of the nodular goiter is a controversial subject. A tissue diagnosis of carcinoma at the time of operation is of considerable help to the surgeon in determining the best method of treatment. However, many surgeons and pathologists view the use of frozen section for diagnosis in thyroid nodules with skepticism. In a small series, Fuller⁷ had 100 per cent accuracy of diagnosis based on frozen section, but in one-third of the cases, a definite diagnosis was not given to the surgeon. Winship and Rosvall¹⁵ report an accuracy of 96.5 per cent in over 200 cases. Lahey,⁹ in a panel discussion, quotes a figure of 95 per cent in his clinic. To clarify the accuracy of frozen section diagnosis in thyroid nodules, thyroidectomies done at the

Mason Clinic from 1950 to 1960 were reviewed.

Results

The technic of frozen section has been adequately described elsewhere,^{1, 3, 5, 12, 14} and the procedure used here is similar. The freezing media is carbon dioxide; a polychrome dye is used for staining and the entire procedure carried out in a specific room on the operating room floor. A diagnosis is usually given the surgeon within four to five minutes after receipt of the tissue.

A total of 557 thyroidectomies were carried out during the years 1950 to 1960 with 215 frozen sections being done. One hundred and seventy-two benign lesions had frozen section diagnosis with two being read erroneously as malignant, for an accuracy of almost 99 per cent. Forty-three carcinomas had frozen section diagnosis made with four being read erroneously as benign for an accuracy of 91 per cent. The over-all accuracy was 97.3 per cent. Table 1 shows the lesions and sites of error in more detail.

Discussion

Upon reviewing the benign lesions which had been erroneously reported as malignant, the diagnosis on permanent section was noted to be equally difficult. A lesion reported to the surgeon as a low-grade Hürthle cell carcinoma was felt to be a fetal adenoma with some Hürthle cell-like components on permanent section. The other lesion was regarded originally as a

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TABLE 1.

Type of Nodule	No. without F. S.	No. with F. S.	Benign Lesions Reported Malig.	% Error
Embryonal adenoma	2	2	0	
Hürthle cell adenoma	1	0	0	
Fetal adenoma	13	13	1	
Papillary cystadenoma	3	4	1	
Nodular hyperplasia	35	10	0	
Thyroiditis (specific and nospecific)	15	14	0	
Colloid nodule				
Simple	190	76	0	
Microfollicular	5	16	0	
With chr. thyroiditis	5	4	0	
With degn. changes	47	28	0	
Invol. nodules	13	5	0	
Totals	329	172	2	1%
Carcinoma				
Papillary	4	26	3	
Alveolar		6	1	
Mixed alveolar-papillary		3		
Undifferentiated	2	6		
"Sclerosing Ca"		1		
Sarcoma		1		
Hürthle cell	1			
Totals	7	43	4	9%
Total thyroidectomies	557			
Total frozen sections	215			
% frozen sections	36.8			
Total erroneous F.S.	6			
Over-all % error	2.17			
% error benign lesions	1			
% error malig. lesions	9			

papillary cystadenocarcinoma, but on permanent section was felt to be a benign papillary cystadenoma. However, close observation of the patient was advised. These two cases point out that a difficult diagnosis on permanent section is no easier on frozen section.

Of the four malignant nodules erroneously reported benign, one was based on an enlarged cystic satellite nodule which was reported as of branchial cleft origin. Another error occurred in a multinodular goiter having colloid nodules as well as the malignant tumor. A report of colloid

goiter was given the surgeon. These cases point up a prime prerequisite in frozen section diagnosis, an excellent knowledge of gross pathology is needed to insure representative biopsy. The third error occurred in a teenage child where the diagnosis was not sufficiently clear to warrant the hazard of unnecessary surgery. The last error was a frank mistake in diagnosis.

The technic of frozen section has been fairly well standardized and the quality of the slides obtained attested.^{5,12} The multinodular nature of some of the thyroid glands occasionally poses a problem in

gross pathology and a nodule in which a sclerosing inflammatory process may be present can be a problem grossly and microscopically, but these are not insurmountable problems in our experience. The reading of the slide should be done by a pathologist who does it routinely and not occasionally, a requirement which applies to all frozen sections.

Summary

Over a ten-year period, 557 thyroidectomies were done and of these 215 had frozen section diagnosis. There were two false positives for an error of approximately 1.0 per cent and four false negatives for an error of approximately 9.0 per cent. The overall accuracy was 97.3 per cent. Frozen section diagnosis is believed to be an accurate and useful procedure in thyroid surgery.

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